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GENERAL INSTRUCTIONS.

Practical instruction in the equipment should be given to each recruit before any attempt is made to instruct him in gun drill. This instruction should take the form of demonstrations dealing with the work of each number in the detachment; and all men under instruction should, in turn, carry out the work of each particular number.

Instruction in gun drill should be given as soon as they are conversant with all parts of the equipment, and can handle in the best and quickest manner each of the working parts of the gun. Once the work of each number has been thoroughly mastered, it should not take long for the recruit to learn the actual drill.

It is most important that a marked distinction should be drawn between instruction and drill.

During the former the language used should be as simple as possible, and the meaning of all technical terms which are necessary must be carefully explained. A conversational tone should be adopted and under no circumstances whatever should anything in the nature of long quotations from drill books be allowed. The men should be permitted to assume an easy attitude and their interest should not be allowed to flag. They should be encouraged to ask questions.

At drill, on the contrary, rigid discipline must be maintained, orders must be clear and decisive, and the detachments made to work steadily, smartly and rapidly. At the same time the utmost accuracy is essential and any deviations from the methods laid down must at once be checked.

CHAPTER I.—GENERAL DUTIES.

This chapter summarizes the duties of each individual number in the detachment. It is only intended as a guide for the instructor, who should use his own words in explaining the various duties to the men.

The detachment is composed of six working numbers, three reserve numbers, and a coverer. The service of the gun is divided between the working numbers as follows :—

1	...	...	...	...	In command.
2	...	...	...	...	The breech.
2 and 3	...	...	...	...	The sights.
4	...	...	...	...	The loading.
5 and 6	...	...	...	...	The ammunition.

The duties of each individual number are as follows :—

No. 1.

1. He **COMMANDS** and is responsible for the entire service of his gun.

2. He gives the **WORDS OF COMMAND** detailed for him in Chapter II, and repeats all **ORDERS** affecting his detachment which have not been heard by the numbers concerned. His orders must be given clearly but no louder than is necessary to enable his detachment to hear.

He assists in passing orders down the battery when necessary.

He acknowledges orders by saluting. He must salute correctly, and face so that his salute can be clearly seen.

3. He is responsible :—

- (i) That the BUFFER is properly filled.
- (ii) That the RECUPERATOR is correctly charged with liquid and air.
- (iii) That the GLANDS, PISTON ROD REGULATING GEAR, and SECURING NUTS are correct.
- (iv) That the PROTRUSION of the STRIKER is correct.
- (v) That the SIGHTS are tested. This is done under the supervision of the section commander.
- (vi) That the MUZZLE VELOCITY of the gun is correctly set on the elevation and fuze indicators.

To ascertain if the BUFFER is properly FILLED, the gun is elevated to 10 degrees, plug N removed and oil should appear.

To ascertain if the RECUPERATOR is CORRECTLY CHARGED, screw in the adapter at L, outer end blanked. Screw the gauge into the adapter. Open valve M and the gauge should register 700 lbs. per sq. in.

4. He selects the GUN PLATFORM, which should be on firm and level ground. If this cannot be found and time permits, the higher wheel is dug in. Failing this, he orders 3 to adjust the traversing gear so that the breech is about two degrees towards the higher wheel.

5. On coming into action he mans the RIGHT GUN WHEEL. When manning wheels, the spokes should be grasped as near the felloes as possible.

6. As soon as the gun is in action, he ascertains the lowest elevation at which the trajectory will CLEAR THE CREST. He reports this elevation to the section commander.

7. He orders the deflection to correct for difference in **LEVEL OF WHEELS**. The difference in level of wheels in degrees, multiplied by the elevation in degrees gives the deflection in minutes required towards the higher wheel. He must not alter this deflection after his gun has once opened fire on this line.

When a switch is made to a target at a different range, or when giving parallel lines from a named gun, he must bear in mind the amount of deflection already on the sight for difference in level of wheels when making the new calculation.

8. He selects the auxiliary aiming point and records on the trail the **ZERO LINE** angles from the auxiliary aiming point and battery picket.

9. Before the gun is laid on a **NEW TARGET** he gauges the line of fire and throws the gun into the line. He will not touch the traversing lever after the gun has been laid.

In traversing the gun by means of the trail, the width of the spade corresponds to 12 degrees of traverse.

10. (i) He applies the **POSITION CORRECTION**, except when laying by field clinometer, and passes corrected elevations to 2. Position corrections, if required, are ordered in the form "No..... always add (or drop)..... yards."

(ii) When laying by field clinometer, he applies the **INDEX CORRECTION**, if any, of his clinometer and passes corrected elevations to 2.

11. When an angle of sight is ordered, he examines the setting of the **SIGHT CLINOMETER**. He occasionally examines the settings of the **ELEVATION** and **FUZE INDICATORS**.

12. He supervises the preparation and supply of AMMUNITION. As time fuzes deteriorate rapidly if unprotected from damp, only such as are required for immediate use will be uncovered. When one group of ammunition is nearly expended, he reports particulars of the next group to be used.

13. He gives the order to FIRE. The gun will on no account be fired without his order. Before giving this order he sees that the gun is in all respects ready.

14. He is responsible that the INTERVAL between rounds is properly kept as regards his own gun. When a salvo or quick rate of battery fire (less than 5 seconds interval) is ordered, he extends his right arm above his head as soon as his gun is ready to fire.

15. If the firing lever on the carriage has been damaged he fires the gun by means of the LANYARD.

16. He watches the length of RECOIL. When the black band on the recoil indicator appears, the buffer should be replenished. When the red band appears, it is dangerous to continue firing.

17. If the run-out during the last few inches is either sluggish or violent he adjusts the VALVE ADJUSTING RUN-OUT.

18. He watches the action of the SPADE on recoil and adjusts its support if necessary.

19. When RAPID or PROLONGED FIRING takes place, he takes every opportunity of attending to his equipment. If the gun is hot, the bore should be cooled with water when "Stand easy" is ordered.

No. 2.

1. He LIMBERS UP and UNLIMBERS in conjunction with 3 and attends the LOWER SHIELD, BRAKE, CLAMP.

ING GEARS, ELEVATION INDICATOR, BREECH MECHANISM and breech and muzzle COVERS.

2. He attends to the BRAKE. Before applying the brake he sees that the quick release lever is housed. When in action or on the road, he must be careful not to apply the brake too hard.

3. In action he mans the right GUNWHEEL, if ordered.

4. He assists 3 to lay by looking along the FINDER of the DIAL SIGHT when the aiming point is to the left or to the rear.

5. Before the elevation indicator can be set, the gun must be depressed by the left elevating handwheel. Should the CRADLE CLAMPING GEAR JAM, insert a spanner No. 123 in the lower elevating handwheel and gently lever it until the clamping gear is free.

6. He sets the ELEVATION INDICATOR to the elevation ordered by 1, closes the breech, removes his right hand from the wheel, and reports "Set" loud enough for 1 and 3 to hear.

7. When laying by FIELD CLINOMETER he sets it at the elevation ordered by 1, and lays the gun for elevation by bringing the bubble to the centre of its run. He sees that the clinometer plane and the base of the clinometer are free from grit or dirt, and that the clinometer is placed in exactly the same position on the plane at each lay.

8. TO OPEN THE BREECH.—He takes hold of the lever with the left hand (pressing the spring with his fingers) and draws it smartly towards him. When the gun is fired he extends his left arm ready to grasp the lever breech mechanism as the gun is running out. As soon as the breech is opened and the cartridge extracted he eases up the extractor so that the next round can slide home into the chamber.

TO CLOSE THE BREECH.—He swings the breech screw smartly round into its position in the gun. He must on no account use the breech screw as a hammer to drive the cartridge home.

9. A dented cartridge case or burred driving band may cause difficulty in closing the breech. If 2 can neither close the breech nor remove the round by means of the extractor, he unscrews the primer with the **KEY REMOVING JAMMED CARTRIDGES**. He then screws the plug end of the key into the primer hole and uses it to withdraw the cartridge. If the cartridge is tightly jammed, it may be hauled out by means of a lanyard attached to the eye of the key.

10. He oils and cleans the **BREECH MECHANISM** when necessary during firing.

11. At cease firing the gun is fully depressed by the right hand elevating wheel and fully elevated by the left hand elevating wheel. The lever of the **TOP CARRIAGE CLAMPING GEAR** is pulled to the rear and the pin inserted in the arc. The **CRADLE CLAMPING GEAR** is engaged by pulling the lever to the rear.

12. When ordered to travel with a round in the bore, he turns the safety catch to **SAFE**.

No. 3.

1. He **LIMBERS UP** and **UNLIMBERS** with 2, and attends to the upper shield. He **LAYS** and **FIRES** the gun. He directs 4 when planting **AIMING POSTS**. He assists 1 to test the **SIGHTS**.

2. (i) He always **LAYS** for **LINE**. He sets on the dial sight the aiming point angle and all deflections ordered. He lays on the left edge of the aiming point unless otherwise ordered.

- (ii) With 2 he LAYS for ELEVATION, except at indirect laying with field clinometer. He sets the angle of sight on the sight clinometer, and lays by bringing the bubble to the centre of its run.
 - (iii) At DIRECT LAYING he lays for line over the open sights, and, with 2 for elevation. At the first opportunity he levels the sight clinometer by means of the micrometer head.
3. (i) When setting the dial sight by means of the QUICK RELEASE, he moves the micrometer head through one complete turn to ensure that the teeth have re-engaged correctly.
- (ii) When SETTING a right deflection on the dial sight, he turns the right micrometer head away from him with his right hand ; when setting a left deflection he turns the left micrometer head toward himself with his left hand.
 - (iii) When READING a left angle on the dial plate he reads the minutes off the left micrometer scale ; when reading a right angle he reads the minutes off the right micrometer scale.
 - (iv) When SETTING the SIGHT CLINOMETER he turns the top of the micrometer head to the left last to take up backlash.
 - (v) When LAYING for ELEVATION he depresses last (top of the handwheel to the front) with at least one complete turn of the handwheel.
 - (vi) The normal positions of his HANDS are as follows : Right hand on the traversing handwheel. Left hand on the elevating handwheel.

4. For the first round the pointer of the TRAVERSING GEAR must be within 30 minutes of zero when the lay is completed, except when engaging G.F. or similar targets. After the spade is embedded, the trail will not be moved so long as the line is within the scope of the traversing gear.

If the trail has to be moved in action, he takes off the brake by means of the quick release lever and puts it on again by the same means when the gun is in the correct position.

5. CROSSHEADS are fitted to aiming posts to compensate for lateral movement of the sight. Both crossheads have similar markings and numbers. He notes which corresponding pair of markings are in line and uses them to lay on. He directs 4 to clamp crossheads low down, so that the bottom of the far one is just visible over the top of the near one.

6. He FIRES the gun. As soon as the gun is laid he removes his left hand from the elevating handwheel, places his right hand on the firing lever and reports "Ready." At the order "Fire" he pulls the lever smartly, releases it at once and replaces his hands in their normal positions. The gun will on no account be fired without the order from 1.

7. The following are the signals used by 3 :—

SIGNAL.	MEANING.
(i) When directing 1 to move the trail :—	
Palm of the hand in the required direction.	Trail right (or left).
Fist clenched ...	Stop traversing.

SIGNAL.	MEANING.
(ii) When directing 4 to plant aiming posts :—	
Right arm extended to the right, or left arm extended to the left.	Move in the direction indicated.
Arm dropped	Halt.
Both arms dropped sharply from above the head.	Plant.
Upward or downward motion of the arms with both arms extended laterally.	Raise or lower the crosshead.
Both arms extended above the head and moved laterally in the required direction.	Move head of post in the direction indicated.
Both arms extended sharply upwards.	Pick up.
Both arms extended to the front.	Move to plant the far aiming.
Body turned about and both arms extended to the rear.	Come in.

No. 4.

1. He LOADS, plants AIMING POSTS, mans the LEFT GUNWHEEL and attends to the WAGON BRAKE on the march and when unhooking.

2. On coming into action he prepares AIMING POSTS with crossheads clamped and sticks them in the ground about 5 yards in rear of the gun.

3. He LOADS. Placing the head of the shell in the bore, being careful not to strike the breech ; he supports the round on the back of the left forearm and pushes it home with the palm of the right hand, fingers uppermost, raising his right hand smartly so that his palm strikes against the upper part of the breech, thus keeping his fingers clear of the breech screw.

He obtains another round from 5 and holds it ready to load.

If a change of ammunition or fuze setting is ordered, he lays his round down and obtains another round from 5. He should be prepared to re-set the fuze of the former round if necessary.

Nos. 5 and 6.

1. They HOOK IN and UNHOOK the wagon team. They prepare and supply AMMUNITION. 6 attends to the WAGON BRAKE in action and works the FUZE INDICATOR.

2. (i) To UNHOOK the wagon team, 5 detaches the off and 6 the near wheel traces from the swingletrees, the inner traces first. 6 orders "Drive on" and steadies the pole ; 5 guides the bar supporting off the pole ; 6 lowers the pole.

(ii) To HOOK IN, 6 holds up the pole near the foot board on the near side and 5 guides the ring of the bar supporting on to the pole. They then attach the wheel traces to the swingletrees, attaching the outer traces first so as to keep the horses in position while they are handling the inner traces.

3. They see that ammunition :—

- (i) has the PRIMERS tightly screwed home.
- (ii) is scrupulously CLEAN, especially the driving bands.
- (iii) is SORTED into groups by nature, weight, fuze and setting correction.
- (iv) is PROTECTED from extremes of temperature and from damp.
- (v) is ISSUED from the group ordered.

4. When preparing H.E. with No. 106 FUZE they remove the cartridge clips. No safety cap is to be removed from a No. 106 fuze, or the wire or seal broken until the round is about to be loaded. On removing the cap they examine each fuze to see that the tape is correctly wound and that the ends of the shearing wire are visible. If a No. 106 fuze has become uncapped or the wire and seal is found to be broken, the fuze is to be regarded as dangerous and treated accordingly. A No. 106 fuze with wire or seal broken is on no account to be replaced in a limber or wagon.

5. When preparing SHRAPNEL they remove the cartridge clips and fuze covers. 6 follows up all orders for corrector and elevation on the FUZE INDICATOR, and calls out the fuze setting loud enough for his section commander to hear. He always uses the reader for following up the elevation, and calls out the highest fuze setting visible to the left of the edge of the reader.

5 sets fuzes with a fuze key to the settings called by 6. He follows up the settings as they are called, so that he has always a round ready to be fired. 6 assists 5 when he is not using the fuze indicator. They re-set each fuze accurately at safety before replacing the round in the wagon.

6. 5 SUPPLIES ammunition to 4, handing him the round with the fuze leading.

7. In action, except when using No. 106 fuze, they always have six ROUNDS READY for loading. If firing is likely to be continuous this number should be increased. Extra rounds may be withdrawn from the wagon and placed on the ground. If the ground is wet or muddy, ammunition should be placed on a sheet.

8. When one group of ammunition is nearly expended, 6 REPORTS to 1 the particulars of the next group.

Nos. 7, 8 and 9.

1. IN ACTION they remain at the wagon line.
2. They assist in the SUPPLY of AMMUNITION and are available to replace CASUALTIES.

THE COVERER.

1. He is SECOND IN COMMAND of the sub-section and is in charge of the firing battery wagon.
2. IN ACTION he remains at the wagon line in charge of the teams and wagons of his sub-section.

CHAPTER II.—GUN DRILL.

Artillery Training lays down the principles of battery tactics, which vary little with different equipments. This chapter details the orders given and the procedure by which these orders are carried out in batteries armed with the 18-pr. Q.F. gun, Marks I-II.

The wording must be memorised and strictly adhered to, with the exception of sections 34, 35, 36 and 37.

The executive order is shown throughout as being given by the section commander, as will normally be the case during training. When orders can be heard throughout the battery they will be acted upon without repetition. Instructors will invariably employ the orders detailed for the section commander, even when drilling a single detachment.

1. POSITIONS AT DETACHMENT REAR.

The detachment falls in two deep, one pace between ranks, 1 on the right of the front rank. 1 is not covered.

When the gun is limbered up, the front rank is three paces in rear of the muzzle, 1 covering the off gun wheel.

When the gun is in action, the front rank is one pace in rear of the trail eye, 1 covering the right gun wheel.

2. TO TELL OFF.

Section commander.

"...section—*Tell off.*"

1 numbers himself 1, the right-hand man of the rear rank 2, his front rank man 3 and so on.

3. TO CHANGE ROUND.

Section commander.

"...section—Change round."

1 takes a pace to the rear with his right foot, and a pace to the left with his left foot. The left-hand man of the rear rank takes a pace to the front. At the same time the remainder of the front rank takes a pace to the right and the rear rank a pace to the left.

(The detachment is then again told off.)

4. POSITIONS WHEN MOUNTED.

1 and the coverer on their horses on the left of the leaders of the gun and firing battery wagon, respectively; 2 and 3 on the gun limber; 5 and 6 on the wagon limber; 4 on the wagon of the firing battery; 7 and 8 on the limber; 9 on the wagon of the first line; even numbers on the near side, odd numbers on the off.

5. TO MOUNT.

Section commander.

"...section—Detachments, prepare to mount—Mount."

The men double to their places at the carriages, 2, 6, 8, and 9 lay hold of the guard iron with the left hand, placing the right foot on the trail or perch; 3, 4, 5 and 7 lay hold of the guard iron with their right hand, placing the left foot on the trail or perch.

At the order "Mount" the whole spring into their places. The men on the limbers turn round to the front, lifting their feet close together, and throwing them over the guard irons.

They sit upright, holding the handstraps with the inner and the guard iron with the outer hand. This is the position of attention.

When travelling over rough ground they should raise themselves to avoid being jolted.

6. TO SIT AT EASE.

Section commander.

"...section—Sit at ease."

The men on the carriages place the outer upon the inner hand and sit well back.

7. TO DISMOUNT.

Section commander.

"...Section—Detachments, prepare to dismount—Dismount."

The men on the limbers turn to the rear, throwing their legs over the guard irons; 4 and 9 stand up.

At the order "Dismount" the whole jump clear of the carriages and form detachment rear.

8. TO MOVE THE GUN WITH DRAG ROPES WHEN LIMBERED UP.

Section commander.

"...section—With dragropes, prepare to advance."

2 and 3 hook the dragropes to the drag washers on their own sides, the backs of the hooks downwards; the two highest numbers go to the pole and the remainder man the ropes, even numbers on the near side, odd numbers on the off.

At the order "Walk march" the carriage is moved to the front.

At the order "Halt" the carriage is halted and the detachment remain at their posts.

At the order "Detachments rear" 2 and 3 replace the dragropes on the shield; the detachment double to their places and halt.

9. TO MOVE THE GUN WITHOUT DRAGROPES WHEN LIMBERED UP.

Section commander.

"...section—Without dragropes prepare to advance."

2 and 3 push in rear of the shield; 4 and 5 man the gun wheels; the two highest numbers go to the pole; the remainder assist: even numbers on the near side, odd numbers on the off.

At the order "Walk march" the carriage is moved to the front.

At the order "Halt" the carriage is halted and the detachment remain at their posts.

At the order "Detachment rear" the detachment double to their places and halt.

10. TO PREPARE FOR ACTION.

Preparation for action will be carried out before leaving the gun park or moving into action. When in action, advantage should be taken of any interval to examine and test equipment.

Section commander.

"...section—Prepare for action."

The detachment, if mounted, dismount.

1 sees that the bore is clear, and satisfies himself that the detachment and equipment are in all respects ready for action.

2 removes the breech and muzzle covers and straps them to the shield. He examines the breech mechanism, extractor, elevating gear and elevation indicator, clamping gears, shield and brake. He replaces the breech and muzzle covers if ordered.

3 examines the sights, elevating, traversing and firing gears, shield and brake.

4 examines the gun limber box and supplies himself with a fuze key from the carriage.

5 examines the wagon limber and 6 the wagon body.

7 and 8 examine the limber of the first line wagon and 9 the wagon body.

The numbers who examine the limbers and wagons uncover time fuzes as ordered, seeing that they are set at safety.

As soon as he has completed his duties, each man reports to 1 and resumes his place. 1 then reports to his section commander "No...ready for action" or otherwise.

11. TO COME INTO ACTION.

Action front.

Section commander.

"...section—Action front."

1 places himself, dismounted, so that he can see when his gun is in the required position. He then orders "Halt—Action front."

The detachment dismount. 1 goes to the near and 4 to the off gunwheel; 2 and 3 go to the trail; 3 releases the limber hook catch and with 2 lifts the trail clear of the hook. 3 orders "Limber drive on." The limber advances one yard, wheels right-about at a trot, and proceeds to the wagon line under the direction of the battery serjeant-major.

3 moves round the trail eye and with 2 carries the trail round through half a circle to the right and lowers it to the ground; 1 and 4 man the wheels. On a side slope the trail is carried round downhill.

When coming into action in the open.

The wagon drives up and halts on the left of the gun as soon as the trail is lowered to the ground. The axle of the wagon body should be one yard in rear and six inches clear of the left gunwheel.

When coming into action under cover.

The wagon halts about 20 yards in rear of the gun until the gun is roughly in the line of fire. 1 orders "Advance," and the wagon drives up as above.

4 puts on the brake; 5 and 6 unhook; 6 orders "Drive on." The team advances 1 yard, wheels left-about at a trot and proceeds to the wagon line under the direction of the battery serjeant-major.

If the order "Wagons right" is given, the wagon drives up on the right of the gun, instead of the left, and the gun and wagon teams wheel to the left and right-about respectively when ordered to "Drive on."

1 throws back the traversing lever.

2 lowers the shield, releases the clamping gears, hands the dial sight to 3, and opens the breech.

- 3 raises the shield, fixes the sight clinometer and dial sight.
- 4 prepares the aiming posts.
- 5 prepares ammunition.
- 6 fixes the fuze indicator on the wagon shield and assists 5.
- The numbers take up their positions in action.

Action right, Action left, Action rear.

At "Action right" the trail is carried round through a quarter of a circle to the left.

At "Action left" the trail is carried round through a quarter of circle to the right.

At "Action rear" the trail is immediately lowered to the ground.

NOTE.—On dismounted parades, 6, 7, 8 and 9 man the gun limber; 6 and 7 in rear, 8 and 9 at the pole.

12. POSITIONS IN ACTION.

1 kneels on the right side of the trail just in front of the trail handle.

2 sits astride the seat on the right side.

3 sits on the seat on the left side.

4 kneels behind 3.

5 kneels in rear of the wagon on the side nearer the gun.

6 kneels in rear of the wagon on the side further from the gun.

7, 8 and 9 remain with the first line wagons. At drill, when no first line wagons are present they take post 6 yards in rear of the gun.

13. TO FORM DETACHMENT REAR IN ACTION.

Section commander.

"...section—*Detachments rear.*"

1 doubles to his place (1 yard in rear of the trail eye and covering the right gunwheel) and gives the order "No. ... double march." At the order from 1 the remainder double to their places and halt.

14. TO TAKE POST FROM DETACHMENT REAR.

Section commander.

"...section—*Take post.*"

The detachment double to their places by the shortest way and halt.

15. TO OBTAIN THE LINE OF FIRE.

The line of fire is obtained by one of the methods described in Artillery Training.

16. TO LAY THE GUN IN THE LINE OF FIRE.

Section commander.

"...section—*Aiming point.....degs.,.....mins. right (or left).*"

1 gauges the line and throws the gun into the required direction.

3 sets the sight clinometer at zero and brings the bubble to the centre of its run by the elevating handwheel. He sets the dial sight at the angle ordered, and lays for line.

2 puts on the brake.

As soon as time permits 3 reports to 1 the readings of the dial sight from the battery picket and auxiliary aiming point ; 1 records them on the trail.

The section commander goes to his guns and takes a note of the angles recorded.

**17. TO ASCERTAIN THE LOWEST ELEVATION
AT WHICH THE TRAJECTORY WILL CLEAR
THE CREST.**

When the crest is within 100 yards of the gun.

The equivalent in yards of the angle of sight to the crest is the elevation required.

3 sets the sight clinometer at zero and brings the bubble to the centre of its run by turning the elevating handwheel.

1 lays the gun just clear of the crest by looking along the bottom of the bore and ordering 2 to elevate or depress as required.

2 reads the required elevation off the elevation indicator and 1 reports it to the section commander.

The section commander adds 500 yards to allow for jump.

When the crest is over 100 yards from the gun.

The procedure is the same, but an allowance is made for the elevation due to the range to the crest.

1, 2 and 3 proceed as above.

The section commander makes a liberal estimate of the range to the crest, looks up in the range tables the equivalent elevation in degrees and minutes, adds 20 minutes to it, converts this angle to yards at the elevation reported by 1, and adds these two elevations together.

18. TO PLANT AIMING POSTS.

Section commander.

"...section—*Aiming posts front (or rear).*"

4 doubles out in front (or rear) of his gun with two aiming posts and plants them as directed by 3 in line with the dial sight set at zero or 180 degrees. He plants the near post first at about 50 yards from the gun. He then plants the further post as far from the gun as possible up to about 100 yards.

If the order "Replant aiming posts" is given, 4 doubles out and, at the signal from 3, pulls up the posts, the further one first, and replants them.

19. PARALLEL LINES TO A NAMED GUN.

Section commander.

"...section (or No....)—*Parallel lines to No....*"

3 of the named gun re-lays for line.

Zero line method.

1 of the named gun reports his angle right or left of his zero line. This angle is ordered to the other guns.

Aiming point method.

The section commander indicates an aiming point. 3 of the named gun swings his dial sight on to the aiming point and 1 reports the reading. This angle, corrected if necessary or parallelism, is ordered to the other guns.

Director method.

3 of the named gun swings his dial sight on to the director and 1 reports the reading. The director is set accordingly and individual angles are ordered to the other guns.

The other guns are then laid in the line of fire as already detailed.

20. TO CHECK PARALLEL LINES.

Section commander.

"...section—*Check parallel lines to No....*"

3 of the named gun lays on the dial sight of each gun in turn.

1 reports the angles to his section commander who passes them to the section commanders concerned.

3 of each other gun lays on the dial sight of the named gun.

1 reports the reading to his section commander, who checks it with the angle taken by the named gun. The sum of the two angles should be 180 degrees. If necessary he corrects the zero line angles.

21. TO LOAD.

Percussion shrapnel.

Section commander.

"...section—*Shrapnel normal (or heavy), Percussion.*"

1 repeats this order, and at the correct moment orders "Load."

5 supplies a round to 4.

4 sees that the fuze is set at safety, loads, and receives another round from 5.

2 closes the breech.

Time shrapnel.

Section commander.

"...section—Shrapnel normal (or heavy), Corrector...."

"(elevation)..."

1 repeats this order, and at the correct moment orders "Load."

6 sets the fuze indicator and calls out the fuze setting.

5 sets the fuze and supplies the round to 4.

4 loads.

2 closes the breech.

High explosive.

Section commander.

"...section—H.E. (fuze)...."

1 repeats this order and at the correct moment orders "Load."

5 uncaps the fuze (if necessary) and supplies the round to 4.

4 loads and receives another round from 5.

2 closes the breech.

After the first round, if there is no alteration in ammunition 1 orders "Load," repeating also any change in ammunition which may be ordered.

During ranging with H.E. or percussion shrapnel, the gun will be reloaded as soon as it has been fired. At other times

the gun will not be loaded sooner than is necessary to maintain the rate of fire.

NOTE.—At drill, only drill cartridges with wooden shells will be loaded.

22. TO UNLOAD.

"No....Unload."

2 opens the breech slowly.

4 withdraws the round and places it on the ground.

NOTE.—The unloaded round can be re-set or returned to the wagon, but rounds with the time rings re-set should be fired as soon as possible.

23. TO LAY THE GUN.

Indirect laying with sight clinometer.

Section commander.

"...section...degs....mins. more right (or left)."

"Angle of sight...degs....mins. elevation (or depression)."

"(elevation)...."

1 applies the position correction (if any) and passes the corrected elevation to 2.

2 sets the elevation indicator and reports "Set."

3 puts on the deflection and angle of sight, lays and reports Ready."

Indirect laying with field clinometer.

Section commander.

"...section...Clinometer laying."

"...degs....mins. more right (or left)."

"(elevation)...degs....mins."

1 applies the index correction, if any, to the elevation ordered and passes the corrected elevation to 2.

2 sets the clinometer, lays for elevation, and reports "Set."

3 puts on the deflection, lays for line and reports "Ready."

1 removes the field clinometer.

NOTE.—When laying by field clinometer, the elevation ordered is the actual elevation at which each gun is to be laid.

Direct laying.

Section commander.

"...section—Reference point...Target..."

"Open sights...degs....mins. more right (or left)."

"(elevation)..."

1 throws the gun into the line.

2 sets the elevation indicator and reports "Set."

3 sets the traversing gear at zero (or at 3 degs. traverse if the order "Target moving from...to..." is given) and puts the deflection on the open sights. He lays direct over the open sights on the ground line of his portion of the target and reports "Ready."

At the first opportunity 3 levels the sight clinometer by means of the micrometer head, thus taking the angle of sight.

If "Indirect laying" is ordered, 3 picks up an auxiliary aiming point with the dial sight. Unless a new angle of sight is ordered, he uses the angle of sight already taken.

24. TO FIRE.

No. 1.

"No...—Fire."

1 orders "Fire" as soon as he has satisfied himself that his gun is ready and his turn to fire has arrived.

3 fires the gun and re-lays.

2 opens the breech.

The gun will on no account be fired without the order from 1.

25. MISS-FIRES.

If the gun fails to fire, 3 gives the firing lever a second pull.

If the gun again fails to fire, 1 allows one minute to elapse, orders "Unload," and examines the primer.

If the primer has failed to fire he examines the cap. If fairly struck, a new primer is inserted. If not fairly struck, the striker is changed.

If the primer has fired a new primer is fitted provided that the round can be fired at once. Otherwise the charge is withdrawn and destroyed. Such a round must on no account be replaced in a wagon or limber.

26. TO CLEAR THE SPADE.

Section commander.

...section—*Spades clear.*"

1 orders "Run up."

3 throws back the quick release lever of the brake.

2 and 4 man the wheels.

1 and 6 man the traversing lever.

At the order from 1 the gun is run to the front until the spade is just clear, 1 orders "Take post."

If necessary on account of heavy ground, 1 orders "With dragropes, run up."

2 and 4 make fast wheel purchases just above the brake blocks.

1 mans the traversing lever, the remainder man the ropes, even numbers on the right, odd numbers on the left.

At the order from 1, the gun is run to the front until the spade is just clear.

1 orders "Take post"; 2 and 4 replace dragropes.

27. TO CHANGE TARGET.

Section commander.

"...section—Change target."

"...degs....mins. more right (or left)"

or

"...degs....mins. right (or left) of zero lines."

1 clears the spade, if necessary, and throws the gun into the new line.

3 sets the traversing gear at zero and turns the micrometer head of the dial sight through the angle ordered.

If the angle is given from zero lines, he sets the dial sight at the recorded zero line angle and then turns the micrometer head through the angle ordered.

The procedure is then as in Section 16 "To lay the gun in the line of fire."

If necessary on account of heavy ground, 1 orders "With dragrope trail right (or left)."

2 hooks a dragrope to the trail handle.

2, 4, 5 and 6 man the rope and heave as directed by 1 or 3.

1 orders "Take post"; 2 replaces the dragrope.

27. TO STOP FIRING.

Section commander.

"...section—Stop."

The detachment continue their duties but the gun is not fired until the order "Go on" is given.

28. TO STAND FAST.

Section commander.

"...Section—Stand fast."

All stand fast whatever they are doing.

At the order "Go on" work is continued.

30. TO STAND EASY IN ACTION.

Section commander.

"...section (or No....)—Stand easy."

This order is given to indicate that firing is temporarily suspended.

Before opening fire again the order "Take post" will be given.

31. TO CEASE FIRING.

Section commander.

"...section—Cease firing."

If the gun is loaded, 1 orders "Unload."

The spade is cleared, 1 folds the traversing lever on the trail.

2 closes the breech, takes off the brake, depresses the gun, raises and secures the lower shield, receives the dial sight from 3, places it in the case, and secures the clamping gears.

3 sets the traversing gear at zero, assists 2 to raise the lower shield, lowers the upper shield, replaces the sight clinometer, hands the dial sight to 2, and secures the quick release lever by its strap.

4 brings in the aiming posts if ordered.

5 and 6 re-set fuzes at safety, replace clips and ammunition, and close all lids.

6 replaces the fuze indicator and takes off the wagon brake.

32. TO LIMBER UP.

Rear limber up.

Section commander.

"...section—Rear limber up."

The detachment take post as follows :—

2 and 3 between breech and wheels, 1 in front of 2; 4 in front of 3, kneeling with their backs to the axletree; 5 and 6 ready to hook in the wagon team.

The limber approaches from the right; 1 orders "Halt" early enough to ensure that when halted the off wheel will be opposite the trail eye; the limber is halted and squared.

1 orders "Limber up"; 2 and 3 lift the trail and place it on the hook; 1 and 4 man the wheels.

The detachment mount without further orders.

On dismounted parades they form detachment rear.

Front limber up.

Section commander.

"...section—*Front limber up.*"

2 and 3 lift the trail; 4 and 5 man the wheels; the gun is run clear of the wagon and the trail is carried round through a half circle to the right and lowered to the ground. The detachment take post as in rear limber up.

The limber drives up on the right and one yard clear of the gun. When clear of the gunwheel, it inclines to the left until the near wheel of the limber has just passed the trail eye.

1 orders "Halt"; the limber is halted and squared.

1 orders "Limber up"; 2 and 3 lift the trail and place it on the hook; 1 and 4 man the wheels.

The detachment mount without further orders.

On dismounted parades they form detachment rear.

Right limber up.

The trail is carried round through a quarter of a circle to the right. The procedure is then as in front limber up.

Left limber up.

The trail is carried round through a quarter of a circle to the left and the limber drives up on the left. The procedure is then as in front limber up.

33. CASUALTIES TO DETACHMENTS.

Men sent to replace casualties report to their section commanders who order such changes of duties as they consider necessary.

Casualties are replaced as follows :—

Section Commander ...	By the senior No. 1 of the section.
1	By a named successor.
With five men ...	5 performs the duties of 5 and 6.
With four men ...	1 performs the duties of 1 and 2. 2 performs the duties of 5 and 6.
With three men ...	1 performs the duties of 1 and 2, and calls out the length of fuze from the fuze indicator on the shield. 2 performs the duties of 4, 5 and 6.

34. CASUALTIES TO EQUIPMENT.

(i) Breech mechanism.

If the breech will not open see that :—

- (a) The trigger has resumed its normal position.
- (b) The guide for mainspring is flush with the face of the breech.

The trigger can be pushed into place by hand. If the guide for mainspring is not flush, remove the firing mechanism. If the breech still cannot be opened, place the point of a pick-axe between the breech mechanism lever and the carrier, press in the catch retaining breech mechanism lever and gently move the breech mechanism lever.

(ii) Sight clinometer.

Lay by means of the field clinometer.

(iii) Elevation indicator.

Lay by means of the field clinometer.

(iv) Dial sight.

Lay on aiming posts over the open sight. To obtain the line before planting aiming posts, lay the gun by means of a dial sight borrowed from another gun.

(v) Wheels.

If a gunwheel is damaged, turn it at once so that the soundest portion bears the weight of the gun. Procure a spare wheel from a limber or wagon and replace the damaged wheel as follows :—

Raise the carriage by lifting on the damaged wheel (or by means of a jack if available). Support the axle by means of the bar supporting pole, placing the lower end on a shovel to prevent it sinking into the ground. The damaged wheel can then be removed and replaced.

If the damage is such that the axle has fallen to the ground it may be raised by means of a limber as follows :—

Place the limber so that the limber hook is over the point of the axle of the gun. Scotch the limber wheels to prevent them running forward. Raise the pole through an angle of about 80 degrees, having first secured a dragrope with which to haul it down. Secure the axle to the limber hook by means of a dragrope and then haul down on the pole.

35. LONG RANGE SHOOTING.**Carriages Marks I* to II only.**

For ranges over 6,600 yards when using the 2 crh shell, the following procedure will be adopted.

The line is obtained, the gun is laid in the line of fire and aiming posts are planted in rear, or a distant aiming point is chosen to lay on from round to round.

The quadrant elevation, consisting of the corrected map range, the gun correction and the angle of sight is calculated. The elevation indicator is set at 10 degrees 30 minutes (5,000 yards) and the M.V. corrector at 1615. The remainder of the quadrant elevation is put on the sight clinometer.

On the level, it is necessary to dig a hole for the trail, 1 foot deep for every 7 degrees over 10 degrees 30 minutes. The hole must not be deeper than is actually necessary or the stability of the carriage will suffer. The wheels should be level.

If a platform can be chosen on a suitable slope, digging a hole for the trail may not be necessary.

Extra drift correction is calculated from the range tables and ordered as left deflection.

Ranging, if necessary, should be carried out in false yards.

Example.

Gun on a level platform and laid in line of fire.

Corrected map range and gun correction	= 7,900 yards	=	22°.37'.
Angle of sight =		+	2°.00'.
			24°.37'.

Orders.

"Dig a hole 2 feet deep."

"H.E. 106."

"All guns 20' M.L." (extra deflection for drift).

"Angle of sight 12° 7'."

"One round Salvo fire."

"5,000."

"Fire."

36. DISABLEMENT.

The extent of disablement ordered will depend on the time available and the probability of recapture.

To disable the gun so that it can be brought into action immediately after recapture ; remove the breech screw.

To disable the gun so that it be brought into action after repair ; disconnect the recoil unit and fire the gun.

To destroy the gun ; place an H.E. shell in the muzzle, load with H.E., and fire the gun by means of a long lanyard from under cover. A length of telephone wire attached to the lanyard is suitable for the purpose.

NOTE.—The dial sight and clinometers should always be removed, and taken away before abandoning a gun.

37. BLANK AMMUNITION.

(i) No officer, non-commissioned officer or gunner who has not been trained and passed in gun drill, is to command a section or form part of a gun detachment firing blank ammunition at salutes or at training.

(ii) When firing Q.F. blank cartridges, no gun is to be reloaded within 15 seconds after firing. Even after this interval, no gun is to be reloaded until 1 has examined the chamber and bore and removed any debris remaining from the previous round.

(iii) In the event of a miss-fire, a further attempt should be made to fire the gun in its turn. In no case must the breech be opened for at least one minute with black powder, and ten minutes with smokeless charges. No one must be in rear of the breach when it is opened. In firing salutes, an

officer or senior non-commissioned officer should be detailed for the special duty of timing the interval after a miss-fire and informing 1 of that gun when the breech may be opened.

(iv) As a further safeguard, 1 is responsible that the charge is properly home in the case before the round is loaded. This can be done by pressing down the leather board cup on the point of the traversing lever, a small mark being made under local arrangements on each traversing lever, to indicate when the charge is in its correct position.

CHAPTER III.—LAYING AND FUZE SETTING TESTS.

1. In every battery there should be at least six qualified layers per sub-section, exclusive of serjeants and lance-serjeants. A list of layers should be kept. All layers, section commanders, serjeants and lance-serjeants should be tested periodically.

2. All officers and Nos. 1 must be thoroughly conversant with :—

- (i) The tests for and care of sighting gear and sights.
- (ii) The methods of obtaining parallel lines of fire.
- (iii) M.V. correctors and corrections for jump and droop.

3. Layers will be tested by means of two tests. Test A will consist of four lays indirect ; Test B of two lays direct.

4. A maximum of 20 marks will be given for each lay in Test A, and 10 marks for each lay in Test B. In order to qualify, a layer must obtain 75 marks.

5. The examiner should be assisted by an officer or senior non-commissioned officer with a stop watch and record book, and by a penciller who will take down all orders given, for reference when checking the lay.

6. When laying indirect, three or more aiming points should be selected to the rear and on either flank if possible, and made known to all concerned.

7. Before beginning the tests at least five targets will be selected in the foreground at varying ranges and angles of sight, and covering a front of about 25 degrees ; except in the case of targets representing guns, these should be natural

features of the ground. If it be necessary to use dummies, they should be placed in positions such as the troops which they represent would naturally occupy on service. A reference point, approximately in the centre of the target zone, will be pointed out to the No. 1 and to the layer. Targets will be indicated with reference to this point by means of the clock code.

8. When laying direct on any target (other than a gun target) which extends over a fairly wide frontage, great exactitude in direction will not be required as regards the point originally selected to lay upon, which may be anywhere in that portion of the target opposite to the gun being laid. Any subsequent lay on the same target must, however, be on the same point as the first.

9. The orders for the lay must be given out by the examiner clearly and distinctly, a short pause (about 2 or 3 seconds), being made after each separate order, thus: "*All guns 20 degs. right*" . . . pause . . . "*All guns 15 mins. more right*" . . . pause . . . "*Angle of sight 1 deg. 20 mins. elevation*" . . . pause . . . "*4200.*"

All orders will be acknowledged by the No. 1 and acted on at once. Should the layer at any time be in doubt as to any particular order, he will refer to the No. 1, who may repeat to him any part of the order received. The No. 1 may, in turn, refer to the examiner.

10. After checking a lay, the examiner will elevate the gun about 15 minutes.

11. In the case of a change target the brake must be taken off and put on by means of the quick release lever.

12. Layers will be examined in pairs (Nos. 2 and 3); for any incorrect portion of a lay marks will be deducted only from the individual making the error.

13. The times allowed for each lay are as follows :—

Test A.				Test B.	
Lay 1.	Lay 2.	Lay 3.	Lay 4.	Lay 5.	Lay 6.
Min. Sec.	Min. Sec.	Min. Sec.	Min. Sec.	Min. Sec.	Min. Sec.
— 45	— 30	— 40	— 55	— 25	— 20

The layer will call out “ Ready ” as soon as he has finished laying the gun. The time will be taken from the conclusion of the orders for the lay until the word “ Ready ” from the layer.

14. One mark will be deducted :—

- (i) For every 5 seconds or fraction of 5 seconds beyond the time laid down for the particular lay.
- (ii) If the traversing gear is not within 30 minutes of zero, except in lays 2 and 6.
- (iii) For each mistake in the manipulation of the sighting gear or in the drill of the layer as laid down.

15. Two marks will be deducted :—

If the angle of sight has not been taken correctly when laying direct.

16. Ten marks will be deducted :—

If the aiming posts are not planted in line.

17. No marks will be given for the lay :—

- (i) If the sight or elevation indicator is incorrectly set.
- (ii) When laying indirect, if the gun is not correctly laid for elevation and direction.
- (iii) When laying direct, if the gun is not laid for elevation within 3 minutes or for direction within 5 minutes.

EXAMPLES OF TESTS.

Laying tests.

The gun is placed on a firm platform. The examiner sets the elevation indicator at about 3,000 yards and the remaining scales at zero.

Test A (indirect).

Orders.

Procedure.

Lay 1.

"Aiming point..."

"All guns, 90 degrees 10
minutes right."

The procedure will be as laid down under "To lay the gun in the line of fire."

The battery picket and auxiliary aiming point readings will be recorded on the trail after 3 has reported "Ready."

"Aiming posts front."

The procedure will be as laid down under "To plant aiming posts."

Time for this part of the lay is not taken.

Lay 2.

"All guns, 1 degree 10
minutes more right."

"Angle of sight, 1 degree 20
minutes' elevation."

"3400."

The procedure will be as laid down under "To lay the gun."

Test A (indirect)—*continued*.

Orders.	Procedure.
Lay 3.	
"Represent No. 2 gun in action."	The procedure will be as laid down under "To change target" and "To lay the gun."
"Change target."	
"All guns, 2 degrees 15 minutes more left."	
"Concentrate 20 minutes on No. 1."	
"Angle of sight, 10 minutes' depression."	
"4275."	
Lay 4.	
"Change target."	The procedure will be as laid down under "To change target" and "To lay the gun."
"All guns, 31 degrees right of zero lines."	
"Clinometer laying."	
"10 degrees 30 minutes."	

Test B (direct).

The reference point is described before orders are given.

Lay 5.	
"Represent No. 3 gun in action."	The procedure will be as laid down under "To lay the gun."
"Infantry lining hedgerow ; 4 o'clock, 3 degrees to 5 degrees."	The bubble of the sight clinometer will be brought to the centre of its run after reporting "Ready."
"Open sights."	
"1200."	
The examiner will put on a deflection and note the reading.	

Test B (direct)—*continued*.

Orders.	Procedure.
Lay 6.	
" <i>All guns, 40 minutes more left.</i> "	The gun will be re-laid on the same point of the target as in Lay 5.
" 1500. "	The deflection ordered will be such as will enable the layer to lay by the traversing gear.

Fuze setting test.

Orders.	Procedure.
" <i>Corrector 152, 4700</i> "	The competitor will set the fuze indicator at the corrector and elevation ordered and will set six fuzes at the graduation shown on the fuze indicator. Time—1 minute.

CHAPTER IV.—SIGHT TESTS.

The field clinometer, sight clinometer and elevation indicator should be tested daily and after prolonged firing. The alignment tests should be carried out as often as possible.

Any adjustment to optical instruments must be carried out by a qualified artificer.

Test 1.—To test the field clinometer.

Set the clinometer at zero ; place it on the clinometer plane and elevate or depress the gun until the bubble is in the centre of its run ; then turn the clinometer end for end.

If the bubble is still in the centre of its run the clinometer is in adjustment.

If the bubble is not in the centre of its run bring it so by moving the slider or, if necessary, the arm and slider. One half of the nett reading is the index error of the clinometer.

If the bubble cannot be brought to the centre of its run by this method, the error of the clinometer may be determined by comparison with a clinometer of known error.

To eliminate an error, the clinometer must be adjusted by a qualified artificer. This adjustment is given in the Handbook.

Test 2.—To test and adjust the sight clinometer.

With the sight clinometer bracket horizontal and the sight clinometer reading zero, the bubble of the sight clinometer should be in the centre of its run.

Place the sight clinometer, set at zero, in its bracket and bring the bubble to the centre of its run by the left elevating handwheel. Reverse the sight clinometer end for end; the bubble should still be in the centre of its run.

If the bubble is not in the centre, bring it so by turning the micrometer head. Note the reading and set the micrometer scales to half this reading. Bring the bubble to the centre of its run by the left elevating handwheel. Slacken the nuts securing the micrometer scales and the screws securing the degree scale; shift the micrometer scales and reader to zero and re-clamp.

Test 3.—To test and adjust the elevation indicator.

With the sight clinometer reading zero and the bubble in the centre of its run, and with the axis of the gun inclined at the necessary angle to the line of sight to compensate for jump and droop, the elevation indicator should read zero. If the jump of any particular equipment has not been determined it will be taken as - 20 minutes.

Set the M.V. corrector at 1615.

Set the sight clinometer at zero and bring the bubble to the centre of its run by the left elevating handwheel; place the field clinometer set at the correction for jump on the left guide rib near the muzzle, and to the rear. Bring the bubble of the field clinometer to the centre of its run by the right elevating handwheel. The elevation indicator should read zero.

If the elevation indicator does not read zero, slacken the nut, revolve the indicator until it reads zero and re-clamp.

Set the M.V. corrector at the muzzle velocity of the gun.

Alignment tests.

Before beginning these tests the following preparations should be made :—

- (i) Place the carriage on a firm platform and manipulate it until it is level transversely. *See* (iv).
- (ii) Select a well-defined object at least 1,500 yards distant on which to lay.
- (iii) If this distant object cannot be found, set up the target testing sights (*see* diagram) about 50 yards in front of the gun at right angles to the axis of the bore.
- (iv) If the carriage cannot be levelled transversely the top of the dial sight carrier and the target testing sights should be sloped to the same angle as the carriage.
- (v) Remove the striker and fix cross wires at the muzzle of the gun.
- (vi) Set the elevation indicator, the cowl of the dial sight, the dial plate and micrometer scales of the dial sight and the deflection scale of the open sight at zero.

Test 4.—To test and adjust the dial sight and open sight for line.

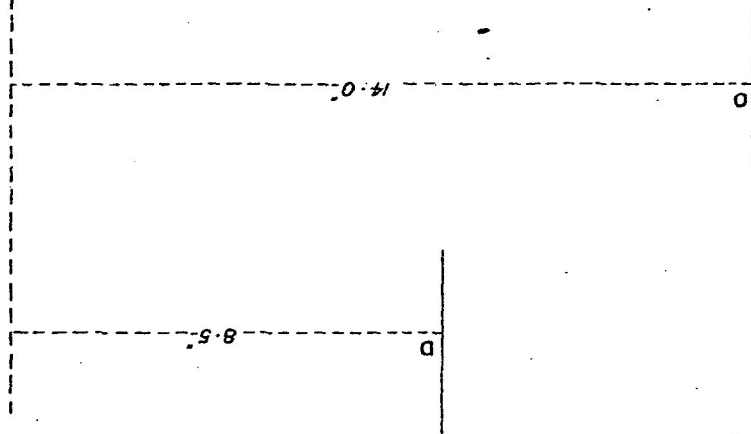
The lines of sight through the dial sight and open sights should be parallel to the axis of the bore as regards line.

Lay the bore on the distant object for line by the left elevating handwheel and the traversing gear, using the intersection of the cross wires as a foresight and the hole in the firing-hole bush as a hind sight. The lines of sight

KEY.
 B - Bore of Gun.
 O - Open Sight.
 D - Dial Sight.



B



TARGET TESTING SIGHTS
 18 PR Q.F MARKS I AND II ON CARRIAGES MARKS I TO II.

through the dial sight and open sights should be on the distant object.

When using the target testing sights lay the bore on point B; the dial sight should be on line D, and the open sights on line O.

If the dial sight is not in alignment, turn the micrometer heads of the dial sight until the line of sight is correct, slacken the screws securing the reader of the dial plate and the nuts of the micrometer, shift the reader and micrometer scales to zero and re-clamp.

If the open sights are not in alignment, slacken the nuts of the cotter pin and partly withdraw it. Slacken the nut of the eccentric bush and move the sight by means of the bush until the line of sight is correct and re-clamp.

Test 5.—To test and adjust the open sights for elevation.

The line of sight over the open sights should be parallel to the sight clinometer set at zero.

Set the sight clinometer at zero and bring the bubble to the centre of its run by the left elevating handwheel; place the bar testing sights on the open sights, and place the field clinometer set at zero on the bar testing sights. The bubble should be in the centre of its run.

If the bubble is not in the centre, bring it so by slackening the fixing screw and screwing the foresight up or down and re-clamp.

CHAPTER V.—CARE OF EQUIPMENT.

1. CLEANING AND OILING.

Limber gunners should be intelligent and reliable men.

The bearing strips on the exterior of the gun, by means of which the gun slides in the cradle of the carriage, should be kept clean and oiled and maintained in good working order; all working surfaces should be well lubricated and kept free from paint.

The bore should be kept clean and lightly greased.

After firing it should be scrubbed out with caustic soda and hot water (1 lb. to a gallon), using the piasaba brush. When dry it should be lightly greased with mineral jelly.

No gritty substance, such as sandpaper or bath brick, should be used for cleaning working surfaces.

All spare parts should be used periodically to ensure that they are in working order.

The axletrees should be greased frequently, the old grease, particularly from the channels of the pipe box, being removed before new grease is applied. If there is side play between the wheel and the carriage, the linch-pin should be withdrawn and the adjusting collar revolved to a suitable position to take up the play.

Heads of lubricators should be kept free from paint.

List of lubricators.

Fitting to be lubricated.	No.	Where situated.
Capsquares	2	On top of each.
Carriage body—		
Bearings, axletree	2	In lubricating cup, 1 on each side.
Bearings, clutch spindle	2	Inside carriage body, 1 on each side.
Cap, lower bracket of	2	In bearing portion for handwheel spindle on left side.
Cradle—		
Body	8	7 in sides for oiling sliding surfaces, and 1 on left side at rear, with tube for lubricating handwheel spindle.
Bearing, pinion, spindle, handwheel.	1	On right side, close to handwheel.
Gear brake—		
Bolts, connecting—		
Cranked levers	3	2 on left side and 1 on right, close to shield.
Eccentric link	1	Rear brake blocks— In head of bolt, left side.
Fork actuating screw	1	In head of bolt, right side.
Fork actuating screw	1	On right side.
Link, eccentric	1	On left side.
Gear, elevating—		
Rod, connecting elevating screw.	1	In lower end.
Gears, firing—		
Arm, connecting	1	In upper end, left side.
Rod, connecting	2	1 at each end, left side.
Bracket, connecting arc, range gear.	1	On left side.
Bolts, connecting brake arm	2	In head of each bolt.
Crosshead, traversing gear	1	

List of lubricators—*cont.*

Fitting to be lubricated.	No.	Where situated.
Lever, traversing	1	At jointed end of lever, near plunger.
Recuperator, bottom guide ...	1	On case.
Sight, rocking bar	1	For oiling arm trunnion supporting sight.
Wheels, 2nd Class, "C" No. 45	2	In inner flanges.
Brecch, screw and carrier ...	1	On top of carrier.
<i>Wagon, Ammunition</i>		
Lovers, cranked brake gear—		
Near	1	Rear of wagon.
Off	1	Rear of wagon.

2. THE No. 7 DIAL SIGHT.

The dial sight when issued is in correct adjustment, water-tight, and with all the cells and joints secured with fixing screws.

It is very unlikely that the interior will require cleaning and the dial sight must on no account be taken to pieces except by a person in possession of an Ordnance College Certificate, stating that he is competent to do so.

The body of the dial sight should be cleaned with a clean soft cloth and a little oil, which must be rubbed off afterwards, care being taken that the glass is not touched. No gritty substance should be used.

The exteriors of eyelens and window should be cleaned with chamois leather, specially kept for the purpose. Great care must be taken that no oil or grease is allowed to touch the glasses. Fingers, though apparently clean and dry, leave marks on the lens which will impair the definition of the sight.

When not in use the dial sight should be kept in its leather case on the shield.

3. THE BREECH MECHANISM.

(i) General precautions.

The breech mechanism should be dismantled periodically in order that it may be thoroughly cleaned.

The threads of the breech screw should be free from burrs. These may be removed by careful filing by an artificer, but no portion of the thread should be cut away to remove a crack.

The breech should be kept covered up, when possible, to prevent dust and grit getting into the breech fittings. A cover is provided for this purpose.

(ii) To dismantle the breech mechanism.

With the breech open remove the keep-pin of the breech mechanism lever hinge bolt, withdraw the hinge bolt, remove the breech mechanism lever guide block with firing lever, and striker. Press in the catch retaining breech screw and unscrew (clockwise) the breech screw from the carrier. Remove the catch retaining breech screw with spring. Remove the keep-pin of the carrier hinge bolt and withdraw

the hinge bolt. Remove the carrier. Remove the keep-pin of the extractor hinge bolt, withdraw the hinge bolt and extractor. Remove the keep-pin and withdraw "Part I" trigger from the left side of the breech, then "Part II" from the rear.

(iii) To assemble the breech mechanism.

The fittings are replaced in the reverse order.

When inserting the breech screw in the carrier, care must be taken before commencing to screw in, to hold the breech screw square against the face of the carrier with one of the threaded portions of the screw uppermost, the stamping on the screw to the rear. Two and a quarter turns of the breech screw are required, the retaining catch being pressed in clear of the recess in the screw during the operation.

When inserting the trigger, first correctly assemble the spring with the projecting ends in the holes for their reception in the "Part I" trigger and bush, then insert the collar on the trigger with the recessed portion innermost, and twist the bush on the trigger until the projection on it engages with the recess in the collar. Insert "Part I" trigger with bush, collar, and spring into the left side of the breech ring, and engage with "Part II" trigger inserted from the rear. Insert the keep pin.

(iv) To dismantle the firing mechanism.

When removing the striker from, or inserting it into, the guide block, the safety catch in the latter must always be in the firing position.

Press on the top of the guide for main spring so as to compress the spring lightly, at the same time tilt the upper end

of the guide from the striker, and withdraw the guide and main spring. Remove the firing pin and the pin securing re-bound block and withdraw the latter. Place the safety catch in the firing position, force it out of its recess in the guide block towards the centre of the block, and withdraw it.

(v) To assemble the firing mechanism.

The firing mechanism is assembled in the reverse order.

(vi) To test the protrusion of the striker.

Swing the breech screw and carrier into the loading position and remove the striker. Take out the main spring from the striker and reassemble the latter. Replace the striker (without main spring) in position in the gun, press in the catch retaining breech screw and revolve the breech screw in the carrier until it is in the position it would be if the breech were closed. Press the striker forward in the breech screw as far as it will go. Apply the gauge, and if the protrusion is not within the limits, change the firing pin.

4. RECUPERATOR AND BUFFER.

General Precautions.

(i) Before firing.

Care should be taken to see that the recuperator and buffer are correctly charged, and there is no leakage at the stuffing boxes, that the cylinder block is firmly nutted up to the lug of the gun, and the piston rod and ram to the front cap, and that the regulating gear is in adjustment.

It is necessary to strain the oil before charging the recuperator or buffer.

During severe weather, recuperators and buffers should be protected as much as possible from the cold.

Any operations for the replacement of worn or defective parts which necessitate emptying the recoil system should be carried out only under qualified supervision.

(ii) **In action.**

Fault.	Cause.	Remedy.
Excessive length of recoil...	Worn piston or recoil valve.	Replace, or shorten recoil by gear regulating.
Violent recoil ...	Loss of liquid from buffer cylinder.	Replenish.
	Loss of pressure ...	Replenish liquid or air.
	Regulating gear out of adjustment.	Adjust.
Gun runs out sluggishly ...	Hot air or gas in buffer.	Shifting valve.
	Valve adjusting run-out, wrongly set.	Adjust.
	Loss of pressure ...	Replenish liquid or air
	Causes other than above.	Replace recuperator unit.
Gun runs out violently ...	Valve adjusting run-out, wrongly set.	Adjust.
	Retarding valve not working correctly.	Replace recuperator unit.

Note.—At high angles of elevation the valve adjusting run-out may require adjustment.

(iii) When guns are resting in action.

Cool the bore. Depress the gun and allow air to escape from the buffer by means of the snifting valve. Replenish the buffer. Tighten packings if necessary. Test air pressures after the gun has cooled and replenish recuperator if necessary.

5. THE RECUPERATOR.**(i) To charge the recuperator with liquid.**

Lash the gun to the cradle and depress a few degrees. Remove plugs K and L and open valve M. Measure out exactly 8 pints of oil and pump it in at K. Close valve M and replace plug K. Elevate and depress the cradle a few degrees several times, then set it horizontal by a clinometer both longitudinally and transversely. Open valve M and remove plug K. Leave the cradle in this position until oil ceases to overflow at L. Close valve M and replace the plugs.

(ii) To charge the recuperator with air.

Before charging with air it is important to see that the securing collar is on the recuperator ram, in order to prevent the ram from being forced out to the rear when under pressure and that the correct quantity of liquid is in the recuperator. Then proceed as follows: Attach the air pump to the bracket on the trial, depress the cradle a few degrees, remove plug L and attach the adapter and pressure gauge; connect the pump pipe to the adapter, open by-pass valve M and pump until the gauge registers 710 lbs. per sq. in. Close valve M, disconnect the pipe from the adapter, and place the cap on the adapter. Let the pressure down to 700 lbs. per sq. in. by opening valve M and slackening the cap on the adapter.

Close valve M, remove the adapter with pressure gauge, and replace plug L. The lashing may now be removed.

When charging by air bottle, care must be taken to open the cock gradually to avoid damage to the gauge.

(iii) **To test the air pressure.**

Remove plug L and screw in the adapter, blanking the outer end with the cap. Screw the gauge into the adapter. Open valve M, when the gauge should register 700 lbs. per sq. in. If correct, close valve M, remove the adapter and gauge and replace plug L. If the pressure is not correct, proceed as in (v).

(iv) **To ascertain the amount of liquid in the recuperator system.**

Remove plug L. Set the elevation indicator to zero. Set the gun horizontal, longitudinally and transversely, by means of the field clinometer. Open valve M slowly; if oil spray issues from L, the liquid level is correct. If air only issues, close valve M. Elevate the gun successively to angles of 45 min., 1 deg. 20 min., 1 deg. 40 min., and 2 deg. 30 min. by means of the right elevating handwheel and elevation indicator. Note the angle of elevation at which oil spray issues on valve M being opened. The amount of liquid lost is derived from the following table:—

Liquid Lost.	Elevation at which oil spray issues.
1 pint.	45 min.
2 pints.	1 deg. 20 min.
3 pints.	1 deg. 40 min.
4 pints.	2 deg. 30 min.

Note.—The gun should not be worked with a greater loss of liquid than 2 pints.

(v) **To replenish air pressure lost by leakage.**

Proceed as for charging the recuperator with air, but before opening valve M to admit air to the reservoir pump pressure in pipe to 700 lbs. per sq. in.

6. THE BUFFER.

(i) **To fill the buffer.**

Elevate the gun to 10 degrees. Remove plugs N. and O. Pour in oil at O until it overflows at N. Replace plug N and continue filling till oil overflows at O. Then by means of the syringe withdraw about $\frac{1}{20}$ th of a pint of oil and replace plug O.

About 5 pints of oil are required to charge the buffer.

(ii) **Regulating gear.**

This gear is to be used to shorten the length of recoil when the latter becomes excessive through wear in the piston or recoil valve.

When the scale is set at 2 a recoil of 43 inches should be expected. This setting is recommended with an equipment which is in good order. If it becomes necessary to reduce the length of recoil, the lever should be moved in the direction of the arrow. Each graduation on the scale corresponds to a difference of one inch in recoil.

(iii) **Glands.**

Glands should be tightened when necessary. It is better to do this when the cradle is warm, as the packings then seat better. They should not be over-tightened, as this may distort the packings and also cause seizure.

To tighten up the glands.—Pull the spring catch to the front, thus disengaging it from the slot in the gland, and tighten up the latter by means of a tommy inserted through the opening in the cap.

If a leakage occurs at the glands and tightening up does not prevent it, a supplementary packing ring should be used ; or if a supplementary packing is already in use, the defective packing should be renewed.

7. THE AIR PUMP.

Before starting work, an external examination should be made to see that the pump is clean and serviceable.

When assembling care must be taken to see that all parts are clean and well lubricated. Working parts will require further lubrication during pumping.

To obtain the best results it is essential to employ a full stroke in working the pump, *i.e.*, from stop to stop.

When charging a system it is best to continue without a stop until the desired pressure is reached, changing the men if fatigued. If a stop is unavoidable, note the pressure and close valve M. Before continuing, pump the pressure in the pipe up to the pressure noted before opening valve M.

If there is any falling off in the working pressure, examine the valves. If gritty, the valves and springs should be removed and cleaned. If necessary, valves should be lightly ground in and coated with thin oil. If this does not improve the efficiency of the pump, the piston should be removed and the rings examined and tried in the cylinders. If the spring of these rings has been destroyed, they must be changed.

The pump must be replaced in its box immediately after use.

The pump should be worked a few strokes daily to ensure that the packings are kept under pressure.

APPENDIX.

CARRIAGE OF STORES.

1.—STORES CARRIED ON CARRIAGE.

Articles.	No.	Where carried.
Axe, pick	1	Under trail.
Brush, breech screw	1	In tool case, rear of shield.
Can, lubricating, No. 9	1	In wood block, rear of shield.
Carrier, No. 7 dial sight, No. 2	1	On shield, in case.
Cases, keys, setting fuze	1†	} On shield.
Cases, field clinometer, No. 1	1‡	
Cases, No. 7 dial sight and carrier, Q.F. 13 and 18-pr.	1	
Cases, sight clinometer	1†	} On left tensile stay.
Cases, spare parts	1	
Cases, spare sight clinometer	1*	On shield.
Cases, tools	1	} In tubular trail.
Cleaner, pinsaba, No. 18	1	
Cleaner, wool, No. 1	1	} On rear of shield.
Clinometer, field	1†	
Clinometer, sight ... (spare)	1*	In case, on left tensile stay.
Clinometer, sight	1	In case, on shield.
Covers, breech	1	} On gun; when not in use
Covers, muzzle, No. 1	1	
Covers, eccentric brake gear	1	} strapped to front of shield.
Drift, No. 12	1	
Gauge, striker protrusion, No. 1	1	} On eccentric of brake gear.
Hammer, claw (24-oz.)	1	
Hammer, claw (24-oz.)	1	} In leather case, on shield.
Implements, ammunition—		
Keys, No. 18 (setting fuze)	2	} In tool case, rear of shield.
Indicator, fuze, Q.F. 18-pr.	1	
Key, removing jammed cartridge, Q.F. 13 and 18-pr.	1*	In tool case, "A" sub-section.

* Per battery.

† Components of carriage.

‡ Per section.

CARRIAGE OF STORES—*cont.*1. Stores carried on Carriage—*cont.*

Articles.	No.	Where carried.
Lanyard, firing, No. 15	1	In tool case, rear of shield.
Oil, Rangoon pints	$\frac{1}{2}$	In lubricating can.
Ordnance—		
Catch, retaining breech screw ...	1§	In leather case, on shield.
Pin, axis, catch, B.M. lever ...	1†	
Pins, firing	2	
Springs, main	1§	
Springs, safety catch	1§	
Springs, trigger	2†	
Springs, tripping-piece	1	In tool case, rear of shield.
Strikers	1	
Pliers, flatnose pairs	1	On front of shield.
Posts, aiming	2	
Ropes, drag, heavy 30-ft. ... pairs	1	In leather case, on shield.
Screwdriver, G.S., 4-in.	1	Right tensile stay.
Shovels, G.S.	1	On shield in case.
Sight, dial, No. 7	1	In tool case, rear of shield.
Spanners, adjustable, 15-in. ...	1†	
Spanners, adjustable, 11-in. ...	1†	
Spanner, hydraulic buffer, No. 123...	1	
Spanner, No. 244	1	
Spanner, hydraulic buffer, No. 169...	1	
Spanner, hydraulic buffer, No. 170...	1	
Spanner, hydraulic buffer, No. 171...	1	
Spanner, hydraulic buffer, No. 174...	1	
Spanner, hydraulic buffer, No. 172...	1	
Spanner, hydraulic buffer, No. 173...	1	In tool case (or cases) on axletree.
Spanner, hydraulic buffer, No. 176...	1	
Tommy, No. 37	1	In case (or cases) on axletree.
Tommy, No. 40	1	
Tool, withdrawing split pins ...	1	In tool case.

† 8 per battery. ‡ Per section. § 1 per 3 guns.

CARRIAGE OF STORES—*cont.*
2.—STORES CARRIED ON LIMBERS.

Articles.	Carriages.	Wagon.	Where carried.
Axe, felling, curved helve ...	1	—	On platform board.
Axes, pick ...	1	2	Under limber.
Bar, supporting draught pole, No. 3 ... (spare)	1	1*	On platform board.
Blankets, G.S. ...	2	2	On top of limber box.
Boxes, grease, 3-lb. ...	1	1	Under platform board, "near" side.
Boxes, dust cap and drag washer	1†	—	On footboard, "near" side.
Breastpiece ...	1	1	On platform board.
Brush, water, carriage ...	1	1	Under platform board, "near" side.
Buckets, water, G.S., canvas ...	12	6	In wire net receptacles.
Cans, lubricating, No. 3 (for Rangoon oil ...)	1	1	Under platform board, "off" side.
Cans, lubricating, No. 3 (for mineral oil) ...	1	1	
Caps, dust, 2nd class "C" capped wheels, No. 1 (spare)	1†	—	In box on footboard, "near" side.
Carrier, ammunition, Q.F. 13 and 18-pr.	1	1	Under blankets.
Cartridges, Q.F. 18-pr. ...	24	38	In ammunition box.
Clips, cartridge, Q.F. 18-pr. ...	24	38	On cartridges.
Cloths, sponge ...	5	5	Under tray, small stores.
Collars, adjusting, 2nd class "C" capped wheels (spare)	1†	—	Tray, small stores, lower.
Covers, breech ...	2	2	On rifles, front of ammuni- tion box.
Crowbars, 4-ft. 1-in. ...	1†	—	On platform board.

* Per sub-section.

† Per section.

‡ Per Battery.

CARRIAGE OF STORES—*cont.*
2. Stores carried on limbers—*cont.*

Articles.	Carriages.	Wagons.	Where carried.
Files, smooth, flat, 6-in. ...	1	—	} Tray, small stores, lower.
Files, smooth, hand, safe-edge, 8-in.	1	—	
Files, 2nd cut, half-round, 6-in....	1	—	
Grease, lubricating ... lbs.	3	3	In grease box.
Handle, air pump ...	1†	—	On platform band.
Handle, file, small ...	1	—	Tray, small stores, lower.
Hooks, bill ...	1	1	Under platform board, "off" side.
Implements, ammunition—			
Holder, cartridge ...	—	1§	Under tray, small stores.
Keys, No. 17 (fixing fuze) ...	1	1	Tray, small stores, lower.
Implements, ammunition—			
Keys, No. 27 (primer) ...	—	1†	Tray, small stores, lower.
Keys, No. 18 (setting fuze) ...	2	2	Tray, small stores, lower.
Keys, split, flat, 1-in. x 4-in. (spare)	1	—	Tray, small stores, lower.
Keys, spring lock ...	1	1	On outside of lid in pocket.
Line, Hambro' ...	1	1	On platform board.
Oil, mineral (for buffers) pints	2	2	} In cans, lubricating.
Oil, Rangoon ... pints	1‡	1‡	
Pins, capsquare ... (spare)	1||	—	Tray, small stores, lower.
Pins, keep, split, $\frac{1}{4}$ -in. x $1\frac{1}{4}$ -in....	1	—	} Tray, small stores, upper (in box, sparesprings, &c.)
Pins, keep, split, $\frac{3}{8}$ -in. x $1\frac{1}{4}$ -in....	1	—	
Pins, keep, split, $\frac{3}{8}$ -in. x $1\frac{1}{2}$ -in. (spare)	3	—	
Pins, keep, split, $\frac{1}{2}$ -in. x 1-in. ...	2	—	
Pins, keep, split, $\frac{1}{2}$ -in. x $2\frac{1}{4}$ -in. ...	1	—	
Pins, keep, split, $\frac{1}{2}$ -in. x $1\frac{1}{4}$ -in. (spare)	9	—	
Pins, keep, split, $\frac{1}{8}$ -in. x 1-in. ...	1	—	

† Per section.

§ 1 per 3 guns.

|| Per battery.

CARRIAGE OF STORES—*cont.*2. Stores carried on limbers—*cont.*

Articles.	Carriages.	Wagons.	Where carried.
Pins, keep, split, $\frac{1}{4}$ -in. \times 5-in. ...	1	—	Tray, small stores, lower.
Pins, linch, 2nd class "C" capped wheels, (spare)	1||	—	Tray, small stores, lower.
Pin, locking, shield pawl (spare)	1||	—	} Tray, small stores, lower.
Pin, draught, No. 3 (spare)	1||	—	
Plate, locking nut, pipe box, 2nd class, "C" wheels (spare)	1§	—	Tray, small stores, upper.
Pump, air, two stage, horizontal, No. 2	1§	—	In box, strapped on top, at rear of limber box.
Primers, percussion, Q.F. cartridges, No. 1 (in tin box)	—	4	Tray, small stores.
(spare)			
Ropes, drag, light G.S. ... pairs	—	1	On platform board.
Screwdriver, G.S., 4-in. ...	—	1	Tray, small stores.
Screws, lubricating hole, boss-head, $\frac{1}{4}$ -in. \times $\frac{1}{4}$ -in. (spare)	2	—	Tray, small stores, upper (in rectangular box).
Shovels, G.S. ...	1	2	On platform board.
Spades ...	1	2†	On "off" side of limber box.
Springs, shield pawl, Q.F. 13 and 18-pr. (spare)	1||	—	Tray, small stores, lower.
Springs, sight clinometer (spiral) Q.F. 18-pr. (spare)	1	—	Tray, small stores, upper (in rectangular tin box).
Springs, plunger, traversing lever, Q.F. 18-pr. (spare)	1††	—	Tray, small stores, upper.

† One each side of limber box.
 || Per battery.

§ Per section.
 †† 1 per 3 guns.

CARRIAGE OF STORES—*cont.*2. Stores carried on limbers—*cont.*

Articles.	Carriages.	Wagons.	Where carried.
Straps, supporting, front (spare)	2	2	} On platform board.
Straps, supporting, rear (spare)	1	1	
Straps, trace ... (spare)	2	2	
Springs, catch, limber and perch hooks (spare)	1†	—	Tray, small stores, upper.
Springs, disc, No. 62 (spare)	1**	—	} Tray, small stores, lower.
Springs, firing gear (spare)	1**	—	
Swingletrees, Nos. 10A or 11 (spare)	1	1	On platform board.
Syringe, extracting liquid ...	1*	—	Under lower tray, small stores.
Traces, saddlery ... pairs	1	1	} On platform board.
Tugs, trace... (spare)	2	2	
Washers, drag, 2nd class "C" capped wheels ... (spare)	1†	—	In box on footboard, "near" side.
Wrench, adjusting, No. 7 dial sight and carrier	1*	—	Tray, small stores, upper.

* Per section.

† One each side of limber box.

‡ When limbers are fitted with new pattern hooks.

** 4 per battery.

CARRIAGE OF STORES—*cont.*

3.—STORES CARRIED ON WAGONS.

Articles.	No.	Where carried.
Bar, testing, rocking-bar sight, Q.F. 13 and 18-pr.	1(a)	In box, on platform board.
Blankets, G.S.	2	On top of ammunition box.
Box, bar, testing, rocking-bar sight, Q.F. 13 and 18-pr.	1(a)	On platform board.
Box, lamp, siege, to hold 2	1††	On footboard.
Boxes, grease, 3-lb.	2	Under platform board.
Bush, testing, sighting, 3·3-in. (c)	1†	In tray, small stores.
Cartridge, Q.F. 18-pr.	38	In ammunition box.
Cases, saw, hand	2	Lid of ammunition box.
Catch, limber hook, No. 2 (spare)	1*§	In tray, small stores.
Clips, cartridge, Q.F. 18-pr.	38	On cartridges.
Grease, lubricating lb.	6	In boxes.
Handspike, common, 6-ft.	1	Under perch.
Implements, ammunition—		
Keys, No. 18 (setting fuze)	2	In tray, small stores.
Indicator, fuze, Q.F. 18-pr.	1(b)	On top of ammunition box of firing battery wagons.
Kettles, camp, oval, 12-qts.	—	Under wagon, as required.
Lamps, siege	2||	In box.
Lashings, tarred, 1-in. × 20-ft.	1†	} Under wagons, as required.
Lashings, tarred, 1-in. × 10-ft.	3†	

* Per section. § When limbers are fitted with new pattern hooks.

† For each ammunition wagon carrying a spare No. 18 pole.

‡ Per battery, carried in A. sub-section. ‡‡ 4 per battery.

|| 8 per battery.

(a) Per battery, carried in F. sub-section.

(b) Per sub-section.

(c) When existing bushes become unserviceable they will be considered obsolete.

CARRIAGE OF STORES—*cont.*3. Stores carried on Wagons—*cont.*

Articles.	No.	Where carried.
Line, white, 1-lb. skeins	1	Under tray, small stores.
Nut, actuating screw, carriage, Q.F. 13 and 18-pr. ... (spare)	1*	In tray, small stores.
Ordnance, Q.F.— Bush, firing hole ... (spare)	1†	In tray, small stores.
Pole, draught, No. 18 ... (spare)	2(b)	Under perch.
Rope, picketing, 60-ft.	1	On platform board.
Saws, hand, 26-in.	2	In cases, saw, hand.
Spanner, No. 93	1(b)	In case, side of ammunition box.
Spanner, No. 267	1(a)	In box, on platform board.
Spindle, catch, limber hooks, No. 2 (spare)	1*§	In tray, small stores.
Spring, catch, limber and perch hook (spare)	1†	In tray, small stores.
Spring, spiral (clock type), range gear, Q.F. 13 and 18-pr.... (spare)	1*	In tray, small stores.
Valise, horse-shoe	1	Front of ammunition box.
Valises, tools, shoeing, wheelers or saddlers	—	Front of ammunition box.

* Per section. † Per battery carried in "A" sub-section.

§ When limbers are fitted with new pattern hooks.

(a) Per battery carried in F. sub-section.

(b) Per sub-section.

SUPPLEMENT FOR GUNS ON MARK I CARRIAGE.

CHAPTER I.

No. 1.

TO ASCERTAIN if the buffer is properly FILLED, the gun is unlimbered and elevated a few degrees. The filling-hole plug on the tank and the air-valve is removed. Oil should be seen in the tank, which, however, should never be quite full.

If a tank is not fitted. The gun is unlimbered and brought horizontal. The filling hole plug is removed, and the control plunger should be seen to be just covered with oil.

CHAPTER II.

Section 17. 10 minutes will be added instead of 20.

CHAPTER IV.

Test 3. Jump will be taken as -7 minutes unless it has been determined for the particular equipment.

CHAPTER V.

1. List of lubricators delete "recuperator, bottom guide."

RECUPERATOR AND BUFFER.

General precautions.

(i) Before firing.

Care should be taken to see that the buffer is correctly charged, that there is no leakage at the gland, that the cylinder is firmly nutted up to the lug of the gun, and the piston rod to the front cap.

(ii) In action.

Fault.	Cause.	Remedy.
Excessive length of recoil	Worn piston	Replace.
Violent recoil	Loss of liquid from buffer cylinder	Replenish.
Gun runs out sluggishly	Hot air or gas in buffer cylinder	Elevate gun and unscrew air valve. If without tank, depress the gun and unscrew the control plunger a few turns.
	Weak or broken springs	Replace.
	Valve in tank out of order	Rectify.
Gun runs out violently	Loss of liquid from buffer cylinder	Replenish.

(iii) When guns are resting in action.

Cool the bore. Allow air to escape from the buffer by means of the air valve, gun elevated. If without tank, depress the gun and unscrew the control plunger a few turns. Replenish the buffer. Tighten packings if necessary.

(MARK I CARRIAGE.)

APPENDIX.

CARRIAGE OF STORES.

1. Stores carried on carriage.

Articles.	No.	Where carried.
Axe, pick	1	Under trail.
Brush, breech screw	1	In tool case, rear of shield.
Can, lubricating, No. 9	1	In wood block, rear of shield.
Carrier, No. 7 dial sight, No. 2	1	On shield, in case.
Case, keys, setting fuze	1†	On shield.
Case, field clinometer, No. 1	1*	On shield.
Case, No. 7, dial sight and No. 2 carrier, Q.F. 13 and 18-pr.	1	On shield.
Case, sight clinometer	1†	On shield.
Case, spare parts	1	On shield.
Case, spare sight clinometer... ..	1§	On left tensile stay.
Case, tools	1	On axletree.
Cleaner, piasaba, No. 18	1	In tubular trail.
Cleaner, wool, No. 1	1	In tubular trail.
Clinometer, field	1*	On rear of shield.
Clinometer, sight ... (spare)	1§	In case, on left tensile stay.
Clinometer, sight	1	In case, on shield.
Cover, breech	1	On gun; when not in use, strapped to front of shield.
Cover, muzzle, No. 1	1	On eccentric of brake gear.
Cover, eccentric, brake gear... ..	1	In leather case, on shield.
Drift, No. 12	1	In tool case, rear of shield.
Funnel, filling, cylinder, No. 1	1	In leather case, on shield.
Gauge, striker protrusion, No. 1	1	In tool case, rear of shield.
Hammer, claw, 24-oz.	1	In tool case, rear of shield.
Implements, ammunition—		
Keys, No. 18 (setting fuze)	2	In tool case.

* Per section.

† Components of carriage.

§ Per battery.

1. Stores carried on carriage—*cont.*

Articles.	No.	Where carried.
Indicator, fuze, Q.F., 18-pr....	1	On shield.
Key, removing jammed cartridges, Q.F. 13 and 18-pr.	1§	In tool case, "A" sub-section.
Lanyard, firing, No. 15 ...	1	In tool case, rear of shield.
Oil, Rangoon pints	$\frac{1}{2}$	In lubricating can.
Ordnance—		
Catch, retaining, breech screw (spare)	1†	In leather case, on shield.
Pin, axis, catch, B.M. lever (spare)	1*	In leather case, on shield.
Pins, firing - (spare)	2	In leather case, on shield.
Springs, main (spare)	1†	In leather case, on shield.
Springs, safety catch (spare)	1†	In leather case, on shield.
Springs, trigger (spare)	2††	In leather case, on shield.
Springs, tripping piece (spare)	1	In leather case, on shield.
Striker (spare)	1	In leather case, on shield.
Pliers, flat nose pair	1	In tool case, rear of shield.
Posts, aiming	2	On front of shield.
Ropes, drag, heavy, 30-ft. ... pair	1	On front of shield.
Screw-driver, G.S., 4-in. ...	1	In leather case, on shield.
Shovels, G.S.	1	Right tensile stay.
Sight, dial, No. 7	1	On shield, in case.
Spanner, adjustable, 15-in. ...	1*	In tool case, rear of shield.
Spanner, adjustable, 11-in. ...	1	In tool case, rear of shield.
Spanner, No. 244	1	In tool case, rear of shield.
Spanner, hydraulic buffer, No. 123...	1	In tool case, rear of shield.
Spanner, hydraulic buffer, No. 123...	1	In tool case, rear of shield.
Spanner, hydraulic buffer, No. 120...	1	In tool case, rear of shield.
Spanners, H.B. No. 162 with tommy, No. 37 (a)	1	In tool case, rear of shield.
Spanners, H.B., No. 163 (a)....	1	In tool case, rear of shield.
Spanners, H.B., No. 163, <i>Mark II</i> (a)	1	In tool case, rear of shield.
Tool, withdrawing split pins ...	1†	In tool case, rear of shield.

* Per section. † Components of carriage. ‡ 1 per 3 guns.
(a) Carriages fitted with tank for hydraulic buffer.

2. Stores carried on limbers.

Articles.	Carriage.	Wagon.	Where carried.
Axes, felling, curved helve ...	1	—	On platform board.
Axes, pick ...	1	2	Under centre futchel limber.
Bar, supporting draught pole, No. 3 (spare)	1	1*	On platform board.
Blankets, G.S. ...	2	2	On top of limber box.
Box, grease, 3-lb. ...	1	1	Under platform board, "near" side.
Box, dust cap, and drag washer	1§	—	On top of limber box, at rear.
Breast piece ...	1	1	On platform board.
Brushes, water, carriage ...	1	1	Under platform board, "near" side.
Buckets, water, G.S., canvas ...	12	6	In wire net receptacles.
Cans, lubricating, No. 3, for Rangoon oil	1	1	Under platform board, "off" side.
Cans, lubricating, No. 3, for mineral oil	1	1	
Cap, dust, 2nd class, "C," capped wheels, No. 1 (spare)	1§	—	In box, strapped on top, at rear, of limber box.
Carrier, ammunition, Q.F. 13 and 18-pr.	1	1	Under blankets.
Cartridges, Q.F. 18-pr. ...	24	38	In ammunition box.
Case, No. 3, lubricating can ...	2	2	Under platform board, "off" side.
Clips, cartridge, Q.F. 18-pr. ...	24	38	On cartridges.
Cloths, sponge ...	5	5	Under tray, small stores.
Collars, adjusting, 2nd class, "C," capped wheels (spare)	1||	—	Tray, small stores, lower.
Covers, breech ...	2	2	On rifles, front of ammunition box.
Crowbars, 4-ft. 1-in. ...	1§	—	On platform board.
Files, smooth, flat, 6-in. ...	1	—	Tray, small stores, lower.

* Per sub-section.

§ Per section.

|| Per battery.

2. Stores carried on limbers—cont.

Articles.	Carriage.	Wagon.	Where carried.
Files, smooth, hand, safe-edge, 8-in.	1	—	Tray, small stores, lower.
Files second cut, half round, 6-in.	1	—	Tray, small stores, lower.
Grease, lubricating ... lbs.	3	3	In grease box.
Handle, file, small ...	1	—	Tray, small stores, lower.
Hooks, bill ...	1	1	Under platform board, "off" side.
Implements, ammunition—			
Holder, cartridge ...	—	1†	Under tray, small stores.
Keys, No. 17 (fixing fuze) ...	1†	1†	Tray, small stores.
Keys, No. 27 (primer) ...	—	1†	Tray, small stores.
Keys, No. 18 (setting fuze) ...	2†	2	Tray, small stores.
Key, split, flat, 1' x 4' (spare)	1	—	Tray, small stores, lower.
Line, Hambro ...	1	1	On platform board.
Oil, mineral (for buffers) pts.	2	2	In cans, lubricating.
Oil, Rangoon ... pts.	1‡	1‡	In cans, lubricating.
Pins, capsquare ... (spare)	1||	—	Tray, small stores, lower.
Pins, keep, split—			
1/4 in. x 1 1/2 in. ...	1	—	Tray, small stores, upper (in "box, spare springs, &c.").
3/8 in. x 1 1/2 in. ...	1	—	
1/2 in. x 1 1/2 in. ... (spare)	3	—	
3/4 in. x 1 in. ...	2	—	
1 in. x 2 1/2 in. ...	1	—	
1 in. x 1 1/2 in. ... (spare)	0	—	Tray, small stores, lower.
1 in. x 1 in. ...	1	—	
1/2 in. x 3 in. ...	1	—	Tray, small stores, lower.
Pins, linch, 2nd class, "C," capped wheels (spare)	1||	—	Tray, small stores, lower.
Pins, locking shield pawl (spare)	1||	—	Tray, small stores, inner.
Pins, draught, No. 3 ... (spare)	1	—	Tray, small stores, lower.

† Lower tray.

‡ 1 per 3 guns.

|| Per battery.

2. Stores carried on limbers—*cont.*

Articles.	Carriage.	Wagon.	Where carried.
Plate, locking nut, pipe box, 2nd class, "C," wheels (spare)	1§	—	Tray, small stores, upper.
Plugs, filling hole, hydraulic buffer, No 12 (spare)	1§	—	Tray, small stores, inner.
Primers, percussion, Q.F., cart-ridges, No. 1 (in tin box) (spare)	—	4	Tray, small stores.
Rings, compressed packing, hydraulic buffer (spare)	2	—	Tray, small stores, upper. each in round tin box.
Ropes, drag, light, G.S. ... pairs	—	1	On platform board.
Screw-driver, G.S., 4-in. ...	—	1	Tray, small stores.
Screws, lubricating hole, boss-head, — in. x $\frac{1}{2}$ in. (spare)	2	—	Tray, small stores, upper (in rectangular box).
Shovels, G.S. ...	1	2	On platform board.
Spade ...	1	2††	On off sides of limber box.
Spring, catch, limber and perch hooks (spare)	1††	—	Tray, small stores, upper.
Springs, disc, No. 62 ... (spare)	1**	—	Tray, small stores, lower.
Springs, firing gear ... (spare)	1**	—	Tray, small stores, lower.
Springs, shield pawl ... (spare)	1||	—	Tray, small stores, lower.
Springs, sight clinometer (spiral) (spare)	1	—	Tray, small stores, upper (in rectangular box)
Springs, plunger, traversing lever (spare)	1§§	—	Tray, small stores, upper.
Straps, supporting, front (spare)	2	2	} On platform board.
Straps, supporting, rear ... (spare)	1	1	
Straps, trace ... (spare)	2	2	On platform board.

§ Per section.

†† 1 on each side of body.

††† When limbers are fitted with new pattern hooks.

§§§ 1 per 3 guns.

|| Per battery.

** 4 per battery.

2. Stores carried on limbers—*cont.*

Articles.	Carriage.	Wagon.	Where carried.
Stud, retaining stuffing box, hydraulic buffer (spare)	1	—	Tray, small stores, upper (in rectangular tin box)
Swingletree, Nos. 10a or 11 (spare)	1	1	On platform board.
Tools, packing gland, Q.F. 18-pr.			
Collar	1§	—	Tray, small stores, upper (in round tin box).
Plug	1§	—	Tray, small stores, lower.
Tools, withdrawing rings supporting packing, Q.F. 13 and 13-pr.	1*	—	Tray, small stores, upper.
Traces, saddlery pairs	1	1	On platform board.
Tugs, trace (spare)	2	2	On platform board.
Washers, drag, 2nd Class, "C," capped wheels (spare)	1*	—	In box strapped on top at rear of limber box.
Washers, packing, hydraulic buffer sets (spare)	2	—	Tray, small stores, upper (in round tin box).
Wrench, adjusting, No. 7, dial sights and carrier	1§	—	Tray, small stores, upper.

§ Per section.

* Per sub-section.

3. Stores carried on wagons.

Articles.	No.	Where carried.
Apparatus adjusting, running-out springs, Q.F., 18-pr.	1††	On platform board.
Bars, testing rocking-barsight, Q.F. 13 and 18-pr.	1(a)	In box, on platform board.
Blankets, G.S.	2	On top of ammunition box.
Box, bar testing rocking-bar sight, Q.F. 13 and 18-pr.	1(a)	On platform board.
Box, lamp, siege, to hold 2	1§§	On footboard.
Boxes, grease, 3-lb.	2	Under platform board.
Bush, testing sighting, 3·3-in.	1**	In tray, small stores, A. sub-section.
Cartridges, Q.F. 18-pr.	38	In ammunition box.
Cases, saw, hand	2	Lid of ammunition box.
Catches, limber hook, No. 2...(spare)	1*§	In tray, small stores.
Clips, cartridge, Q.F. 18-pr....	38	On cartridges.
Covers, apparatus, adjusting, running-out springs	1††	On platform board.
Grease, lubricating	6	In boxes.
Handspike, common, 6 feet	1	Under perch.
Implements, ammunition—		
Keys, No. 18 (setting fuze)	2	In tray, small stores.
Indicator, fuze, Q.F. 18-pr.	1‡	On top of ammunition box of firing battery wagons.
Kettles, camp, oval, 12-quarts	—	Under wagon, as required.
Lamps, siege	2(d)	In box. .

** 1 Per battery. When existing bushes become unserviceable they will be considered obsolete.

* Per section. †† Per battery, carried in A sub-section.

‡ Per sub-section. (a) Per battery, carried in F sub-section.

§ When limbers are fitted with new pattern hooks

§§ 4 per battery. (d) 8 per battery.

3. Stores carried on wagons—*cont.*

Articles.	No.	Where carried.
Lashing, tarred, 1-in. x 20-feet ...	1†	Under wagon, as required.
Lashing, tarred, 1-in. x 10-feet ...	3†	Under wagon, as required.
Line, white, 1 lb. skeins ...	1	Under, tray, small stores.
Nut, actuating screw, carriage, Q.F. 13 and 18-pr. (spare)	1*	In tray, small stores.
Ordnance—		
Bush, firing hole ... (spare)	1(b)	In tray, small stores.
Pole, draught, No. 18 ... (spare)	2†	Under perch.
Rope, picketing, 80-feet ...	1	On platform board.
Saws, hand, 26-in. ...	2	In cases, saw, hand.
Spanner, No. 93 ...	1‡	In case, side of ammunition box.
Spanner, No. 267 ...	1(a)	In box, on platform board.
Spindle, catch, limber hook, No. 2 (spare)	1*§	In tray, small stores.
Spring, catch, limber and perch hook (spare)	1§	In tray, small stores.
Spring, spiral (clock type), range gear, Q.F., 13 and 18-pr. (spare)	1*	In tray, small stores.
Valise, horse shoe ...	1	Front of ammunition box.
Valises, tools (shoeing, wheelers, or saddlers)	—	Front of ammunition box.

* Per section.

† For each ammunition wagon carrying a spare No. 18 pole.

‡ Per sub-section.

§ When limbers are fitted with new pattern hooks.

(a) Per battery, carried in F sub-section.

(b) Per battery.

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